

# **System Implementation: Lessons Learned But Not Forgotten**



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# System Implementation: Lessons Learned But Not Forgotten

## Maimonides Medical Center



2001 Revenue:	\$516.3 million (Un-audited)
Discharges:	36,861
Pt. Days:	204,550
Average LOS	5.5
Casemix Index	1.84

ED Visits:	76,550
OPD Visits:	253,316

# System Implementation: Lessons Learned But Not Forgotten

## Vision of MMC's Electronic Medical Records

- Improve quality and patient outcomes and measure them
  - Alerts, reminders, decision support
- Compliance with regulatory requirements
  - Problem Lists
  - Enhanced Documentation
  - Health Maintenance Record
- Re-engineer healthcare processes and improve efficiency
- Improve patient revenue, increase cash and profits
- Improve patient satisfaction

# System Implementation: Lessons Learned But Not Forgotten

- Improve availability of patient clinical information and images to multiple providers in different locations at the same time, including:
  - Hospital
  - Clinics
  - Affiliated Nursing Homes
  - Faculty Practices
  - Voluntary/Community Physician Offices
  - Joint venture Home Health Organizations
- Achieve 100% physician utilization of all technology

# System Implementation: Lessons Learned But Not Forgotten

**Objective: 100% physician chart documentation, including direct order entry and result reporting**

- Current state of Healthcare Information Systems have matured with advanced knowledge and decision support features
- However, to take advantage of this functionality, physician use at point of care is required  
but...
- Only an estimated 4% of MDs in U.S. are currently entering orders and obtaining results/reports/images for patient care services

# System Implementation: Lessons Learned But Not Forgotten

## **The Challenge: Creating Physician Partnerships**

- Create the “right” information system environment
  - Have a consistent, committed and dedicated IT staff
  - Proven management and leadership skills
  - Choose clinical staff with recognized and respected clinical experience
  - Knowledge of the internal workings of the organization
  - Excellent interpersonal relationships with the medical staff
- Selecting the “right” vendor partners
- Establish programs specifically focused toward physician participation, buy-in and ownership of the system
- Building the “right” MIS team includes Physician and Nurse Informatists

# System Implementation: Lessons Learned But Not Forgotten

## **The Challenge: Creating Physician Partnerships**

- Identifying project sponsors—who will break down barriers
  - Perceived as formal or informal leaders, who have a clear vision of the organization's mission
  - With strong belief in implementing the system as a tool to achieve the objectives and fulfill the strategy of the organization
  - Provide customized knowledge-based order sets
  - Plan extensive round-the-clock training and continuing clinical support

# System Implementation: Lessons Learned But Not Forgotten

## The Information System Environment: The core of the Computerized Patient Record (CPR)

- Eclipsys 7000 (MACS) – to be replaced by Sunrise Clinical Manager (2003)
- NextGen Ambulatory EMR (2001)
- E&C IPro – Obstetrical EMR (2001)
- A4 Emergency Department EMR (2001)





# System Implementation: Lessons Learned But Not Forgotten

A “big bang” implementation is not for the faint of heart!

## Feeder Systems:

- Squest Laboratory System
- Hemocare Blood Bank System
- IDX RAD Radiology System
- SynerSource – transcription all other ancillary reports
- StorComm – PACS – Radiology Images
- TALK Technology – Voice Recognition
- SMS/American Healthcare Systems
- TSI Decision Support System
- PeopleSoft HR and Financial Systems
- Open Hub Interface Engine

# System Implementation: Lessons Learned But Not Forgotten

A “big bang” implementation is not for the faint of heart!

## How MACS is used

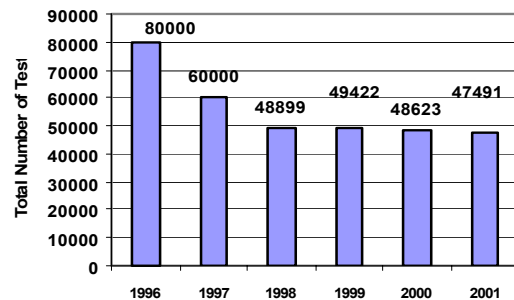
- Permanent inpatient, patient record
- All physicians enter orders online, obtain drug interactions and alerts, retrieve clinical data, results, and images
- Nursing documents administration and retrieves clinical information
- Ancillary departments status tests, cancel duplicate tests



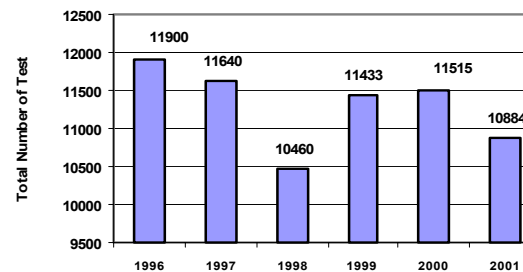
# System Implementation: Lessons Learned But Not Forgotten

## Maimonides Medical Center 1996 – 2001 Laboratory Data

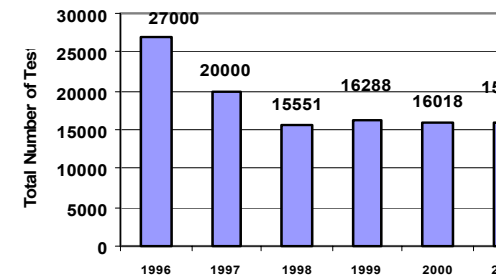
**Microbiology**



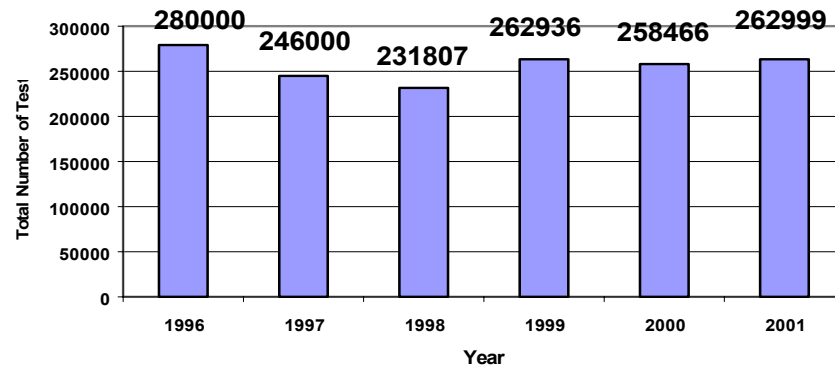
**Serology**



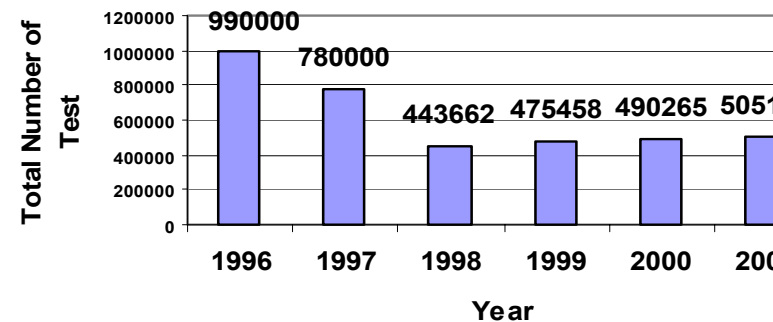
**Urinalysis**



**Hematology/Coagulation**



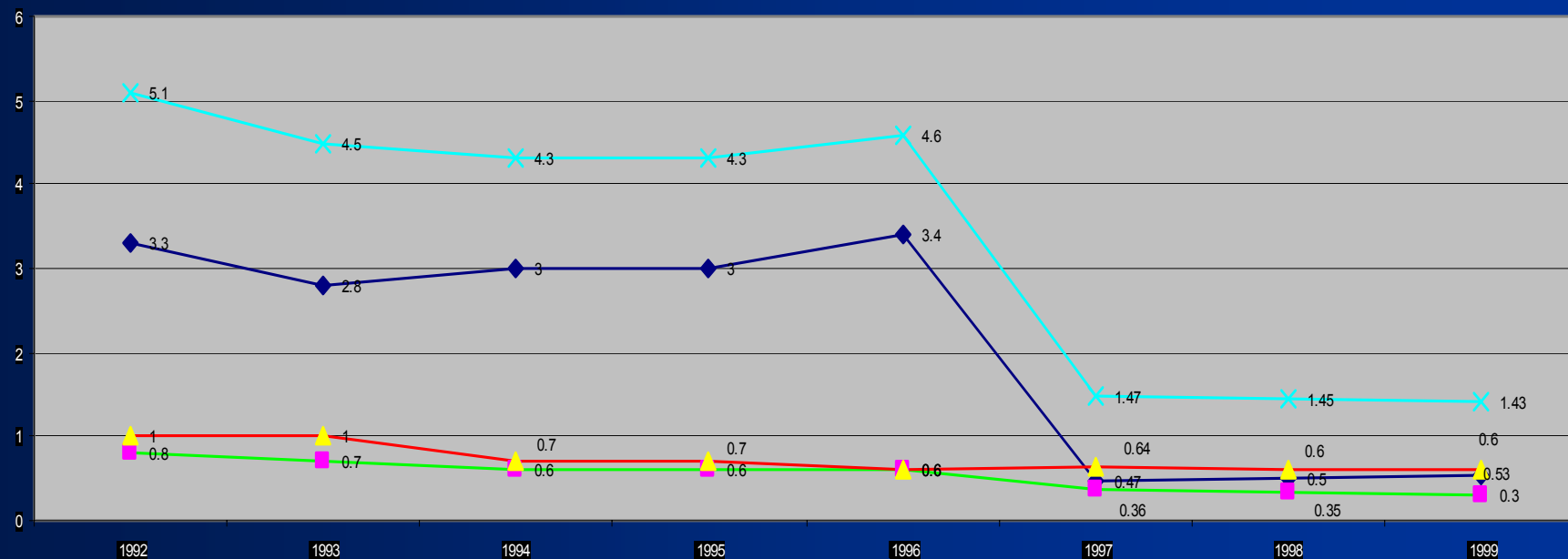
**Chemistry**



# System Implementation: Lessons Learned But Not Forgotten

## Pharmacy Results on Medical/Surgical Areas

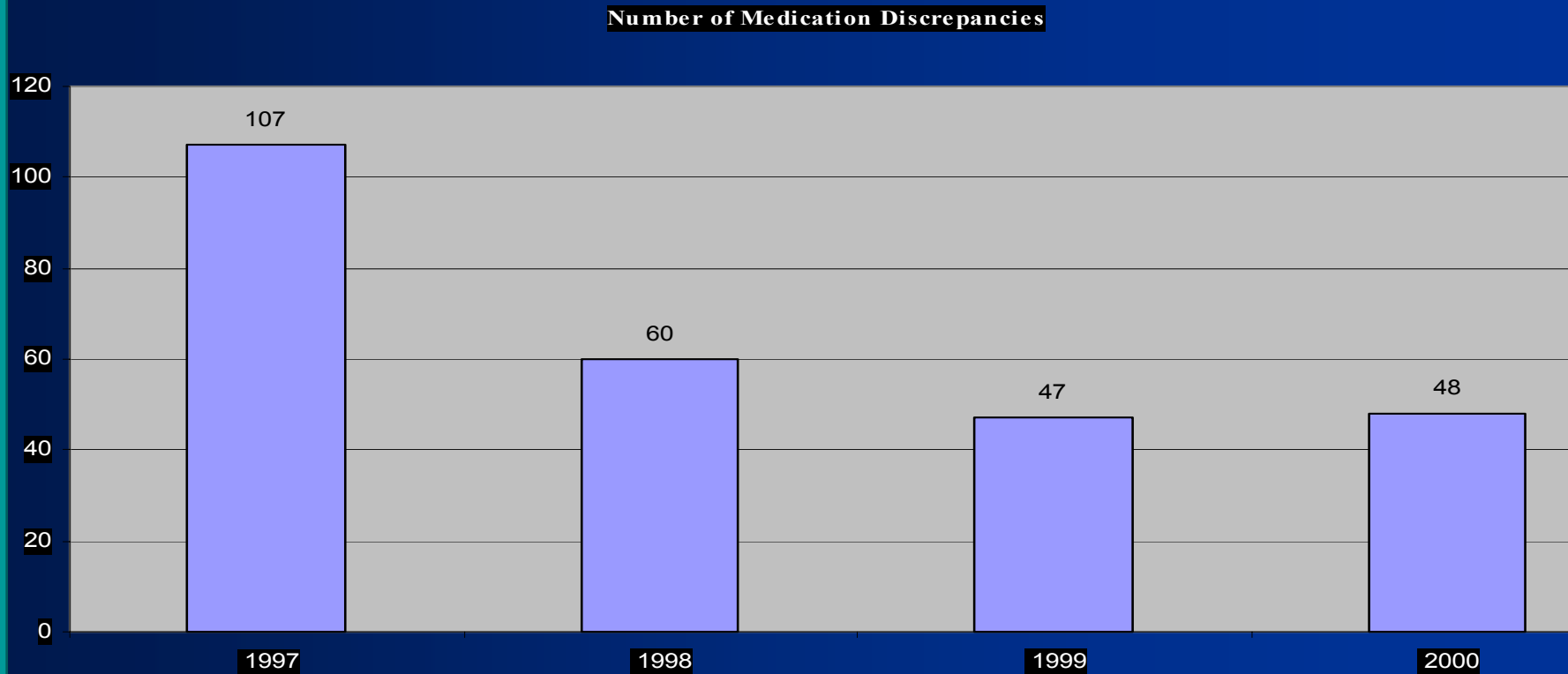
Time Required by Pharmacy Department to Process Physician Order  
(Time in Hours)



- ◆ Time from when order is initiated until Pharmacy acknowledges order
- Time for Pharmacist to process order
- ▲ Time for prescription to be filled and delivered to patient area.
- ✕ TOTAL TIME REQUIRED

# System Implementation: Lessons Learned But Not Forgotten

## Number Of Medication Discrepancies



Definition Of Medication Error : is a flaw or failure in the medication use process that involves prescribing, dispensing, medication administration, transcription or an omission

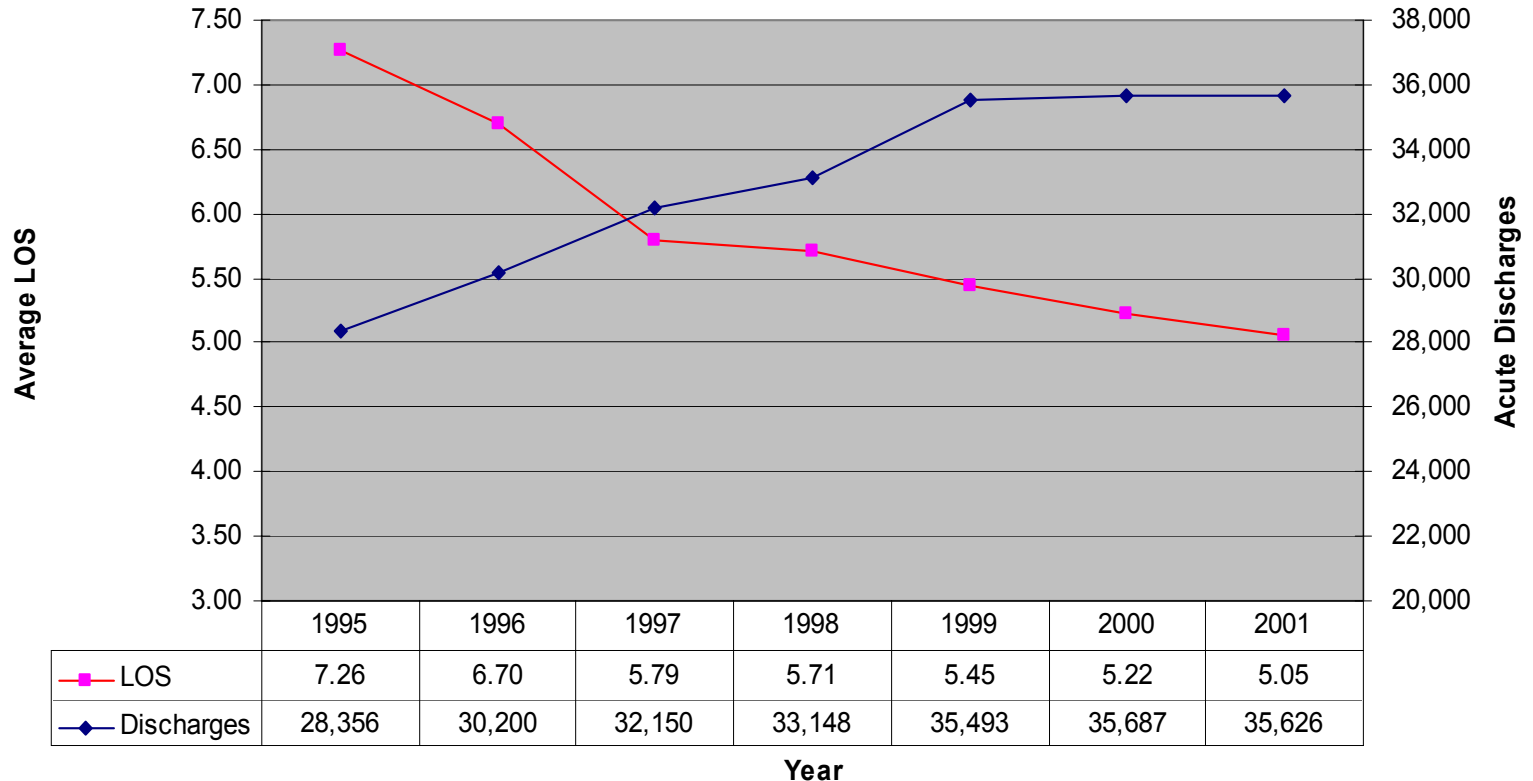
# System Implementation: Lessons Learned But Not Forgotten

## Drug Interaction Alerts History 2001

■ Total Medications Ordered	774,168
■ Drug Allergy Alerts	4,015
■ Drug to Drug Interaction Alerts	3,060
■ Drug Overlap Alerts	94,900
■ Type In Medication Interaction	14,235
■ Total Unclassified Allergy	84,315

# System Implementation: Lessons Learned But Not Forgotten

## MAIMONIDES MEDICAL CENTER



# System Implementation: Lessons Learned But Not Forgotten

## **Initial Benefits Achieved:**

- 68.0% decrease in medication processing time
- 60.1% decrease in medication discrepancies
- 20.0% overall decrease in duplication of ancillary orders
- 48.0% decrease in laboratory tests
- 12.4% decrease in length of average stay\*
- Additional \$19.8m thru increased admissions

\*partially attributable to IS



# System Implementation: Lessons Learned But Not Forgotten

## Eclipsys Lessons Learned

- A high level of physician order entry is achievable
- Benefits are measurable and real
- Requires clear vision and commitment on the part of the organization
- Don't skimp on training or support
  - Round-the-clock training – over 2-1/2 years, trained 9,864 individuals, 39,929 hours
  - Provide a clinically staffed Help Desk 24x7

# System Implementation: Lessons Learned But Not Forgotten

## Eclipsys Lessons Learned

- Interface engine must be monitored 24x7
- Merge your medical records numbers to have a clean MPI
- Develop down-time procedures in place and revisit frequently – soon no one remembers paper

# System Implementation: Lessons Learned But Not Forgotten

## Intelligent Patient Record for Obstetrics

### ■ Maimonides Issues:

- Medical malpractice premiums
- Sub-optimal chart documentation
- Essentials monitoring
  - » long gaps in documentation values
  - » Failure to monitor specific values
  - » Inconsistencies among staff for the scores/levels obtained
- OB physician fatigue
- Suboptimal billing attending physician involvement
- Improperly executed consents

# System Implementation: Lessons Learned But Not Forgotten

## Intelligent Patient Record for Obstetrics Request For Proposal

- User friendly system addressing all aspects of Perinatal and Obstetrical Care inclusive of Prenatal, Triage, Labor and Delivery and Post Partum
- System must be capable of interfacing with the following systems
  - ADT/Billing
  - Agilent Fetal Monitoring
  - Laboratory/Blood Bank
  - MACS (Hospital Information System)
  - Radiology
  - OB UltraSound
- Provide case management support to Nursing and Medical Staff for improved quality of care

# System Implementation: Lessons Learned But Not Forgotten

## Intelligent Patient Record for Obstetrics Request For Proposal

- Collect and archive all patient information
- Flexibility and Scalability (growth)
- Complaint with NYS/HIPAA Regulations including Electronic Signature
- Complaint with current and planned obstetrical standard of care (ACOG)
- Has Expert Knowledge and Decision Support
- 99% uptime
- Open system architecture/manageable database
- On site response within 4 hours or less
- Training/implementation support

# System Implementation: Lessons Learned But Not Forgotten

## Intelligent Patient Record for Obstetrics Vendor Selection

Request for Proposals (RFP) were sent to the following vendors:

- Agilent Technologies
- E&C Medical Intelligence, Inc.
- Life Care Technologies
- LMS Medical Systems
- Physician Software Solutions Inc.

LMS Medical Systems and Physician Software Solutions declined to respond because their product was not the complete solution Maimonides was looking for.

# System Implementation: Lessons Learned But Not Forgotten

## Intelligent Patient Record for Obstetrics

- After five weeks
  - Improved documentation
- Real-time adherence to medical-legal documentation and practice guidelines
  - Better monitoring capabilities
- Essential management prompts
- Data discrepancy alerts to prevent errors
  - Changes beginning in clinical management and documentation performance

# System Implementation: Lessons Learned But Not Forgotten

## **Initial Lessons Learned** **Perinatal Electronic Record**

Go Live November 25, 2001

- Complex project from point-of-data collection, redesign of workflow, and testing and integration into hospital information system
- Real-time training, including integrated workflow for providers and nursing staff; “How to” and “What to” documents
- Additional testing time needed for Decision Support Systems, more complex with regard to the integration of lab, pharmacy and clinical decisions
- Increase the amount of parallel testing in production of the application



# System Implementation: Lessons Learned But Not Forgotten

## Initial Lessons Learned Perinatal Electronic Record

- Intense “go live” support with clinical staff familiar with system and unit workflows
- Ensure all clocks in LDR and PCs are in sync
- Provide practice sessions and PCs test prior to go live and during go live
- Do not assume staff are familiar with navigating windows environment
- Ability to have Hospital Drug Formulary embedded in the system  
Default common ATT drugs
- Ensure same levels of Alerts and Drug Interactions are used in First Data Bank in all systems

# System Implementation: Lessons Learned But Not Forgotten

## Initial Lessons Learned Perinatal Electronic Record

- More vendor supplied structured documentation and education regarding application, hardware and system administration with technical and clinical staff
- Ensure correct registration process and downtime procedures are being followed
- Test every potential registration error consequence to system and develop potential fixes
- Develop backup solutions for printing
- Ability to reprint Specimen Transmittals and Requisitions
- Need to develop CQI strategy for Real Time Review and Retrospective Chart Review of Documentation prior to go live – and have dedicated staff to do this

# System Implementation: Lessons Learned But Not Forgotten

## **Ambulatory Electronic Medical Record**

- Compliance with Regulatory Requirements
  - Problem lists
- Improved Documentation
  - Health maintenance record
  - Reduction in adverse drug events
- Reduction in time management for Laboratory and Radiology

# System Implementation: Lessons Learned But Not Forgotten

## **Ambulatory Electronic Medical Record**

- Availability of Information at Point of Care
  - Reduced errors and enhanced clinical decisions
  - Make records available to multiple providers in different locations at the same time
- Improved Revenue
  - Visit level
  - Charge capture
- Improved Patient Satisfaction

# System Implementation: Lessons Learned But Not Forgotten

NextGen: EDIS TEST - [01/25/2002 - 014: "Intake"]

File Edit Default View Tools Utilities Window Help

8 Ave Medi

**IMChief Complaint**

Patient: EDIS  
MR#: 00910612

**Reason for Visit**

1 chest pain 3  
2  
3

**Vital Signs:**

Height: in  
Weight: lb  
Temperature: 99.00 F  
Pulse: 68 C  
Resp: 16

**Blood Pressure:**

Left Arm Sitting: 164 /  
Right Arm Sitting: /  
Orthostatic BP: Repe

Documented by: Annett

☐ Patient Alerts  
Master

**IMChief Complaint**

breast mass  
breast tenderness  
bruising  
burning in feet  
cancer  
cataracts  
cervical cancer  
check up  
chest pain  
chest pressure  
chills  
claudication  
cold intolerance  
cold symptoms  
colon cancer  
constipation  
COPD  
coronary artery disease  
coryza  
cough  
cramping  
Crohn's Disease  
depression  
diabetes  
diarrhea  
difficulty breathing  
difficulty with speech  
diminished urinary stream  
diplopia  
disequilibrium  
disorientation  
diverticulitis  
diverticulosis  
dizziness

Age: 40 Years Sex: F

**History**

**Duration**

**Severity**

3/10

Glucose: 120

☐ Post prandial

Baseline: liters/min

LMP: / /

☐ LMP unknown

up on lab and diagnostic testing

☐ Reviewed Allergies

allergy\_comment

ALLERGIES

Save

Close

Visits Demographics

New Lock

01/25/2002 - 014

Intake

MMC PC Master

01/25/2002 - 013

01/25/2002 - 012

01/16/2002 - 011

12/28/2001 - 010

12/14/2001 - 009

11/01/2001 - 008

10/29/2001 - 007

Custom

Ready

CAP NUM SCRL Saturday January 26, 2002

SELECTION FROM POP-UP SCREEN

# System Implementation: Lessons Learned But Not Forgotten

NextGen: EDIS TEST - [01/25/2002 - 014: "Intake"]

File Edit Default View Tools Utilities Window Help

8 Ave Medicine PCC BOND, HARRY

Patient: EDIS TEST DOB 09/01/1961 Age 40 Years Sex F  
MR# 00910612

### Intake

	Reason for Visit	Onset	Frequency	Duration	Severity
1	chest pain	3 Days ago			
2					
3					

**Vital Signs:**

Height: in. Weight: lbs. Temperature: F Pulse: Resp: Finger Stick / Glucose: liters/min

**Blood Pressure:**

Left Arm Sitting: Right Arm Sitting: Orthostatic BP: Repeat BP: Lg cuff: LMP unknown: Diagnostic testing: Allergies: comment:

Documented by: Annette Angelone

Comments:

Time Interval

Days: 3 Weeks: 0 Months: 0 OK Cancel

Patient Alerts Master Education Form Intake Document Save

Visits Demographics

New Lock

01/25/2002 - 014  
MMC PC Master  
01/25/2002 - 013  
01/25/2002 - 012  
01/16/2002 - 011  
12/28/2001 - 010  
12/14/2001 - 009  
11/01/2001 - 008  
10/29/2001 - 007  
10/29/2001 - 006

Custom

Ready CAP NUM SCRL Friday January 25, 2002

ONSET SELECTION

# System Implementation: Lessons Learned But Not Forgotten

NextGen: EDIS TEST - [01/25/2002 - 014: Document "Intake"]

File Edit View Tools Utilities Insert Format Window Help

8 Ave Medicine PCC BOND, HARRY

Arial 11

**INTAKE DOCUMENTATION**

Reasons for patient visit today are:

**1. chest pain:**

Onset was **3 Days ago**. It occurs frequently. The severity is 3/10.

**Vital Signs:**

Temp: 99.00 F. Pulse: 68 (irregular). Resps: 16.  
Blood Pressure: 164/86 Left arm sitting.

Fasting glucose finger stick shows 120.

**Allergies**

Description	Rxn Desc	Comment
Cats	lthing	

**Documented by: Annette Angelone**

Ready

Page: 1/1 Line: 1 Column: 1  
CAP NUM SCRL Friday January 25

# System Implementation: Lessons Learned But Not Forgotten

## Ambulatory Electronic Record Lessons Learned

- Be wary of vendors definitions of Decision Support. Does the system have built-in decision support or is it decision support capable?
- Not all medication interaction modules are the same – make sure you know the version the vendor is providing
- Back-loading chart abstracts prior to go-live is required to ensure minimal impact on operations



# System Implementation: Lessons Learned But Not Forgotten

## Ambulatory Electronic Record Lessons Learned

- Phasing the go-live is essential because of conversion from paper to automation and the significant workflow changes
- Plan for more go-live support than Order Entry Systems
- Add Physician and Nurse Informatists to IT to develop templates and recommend workflow changes to ensure rapid adoption of the technology
- Provide wireless, PDAs and other handheld devices to ensure 100% physician utilization – hardware is cheap!

# System Implementation: Lessons Learned But Not Forgotten

## Emergency Department EMR RFP Selection Criteria

- Concurrent access to patient record for multiple users
- No lost/misplaced charts
- Efficient patient/order tracking; order processing
- Expertise in developing complex order/results interfaces
- Ability to add/willingness to explore expanded functionality i.e. digital paging, auto patient tracking, etc.
- Ability to replace/consolidate the functionality of disparate systems currently used
- Ease of use

# System Implementation: Lessons Learned But Not Forgotten

## A4 Emergency Department EMR

### Log-on screen

REGISTRAR, KELLY 39y F Rm: Amb Triage - [Patient Tracking Board]

Track	IncCh	MPI	Summ	ChRev	Docmt	VS	Flows	AltCare	Scan	BdView	Repts	Ref OL
Wait	283:29	*****		81y F Initial	With Registrar	90 Hrs 0Min					LSERR	
Amb Triage	92:04	Abdominal pain		31y M Initial	With nurse	91 Hrs 49Min					RWA	
Amb Triage	91:46	Abdominal pain		53y F Unsch. < 2	With nurse	89 Hrs 7Min					BDUCK	
Amb Triage	91:27	Abdominal pain		39y F Initial	With Registrar	26 Hrs 44Min					JCADE	
Wait	1:19	*****		52y F Initial	Awaiting Clinician	1 Hrs 14Min						
Wait	0:18	*****		61y M Initial	Awaiting Clinician	10Min						
Peds6a	92:45	Fever		1y F Initial	With Registrar	90 Hrs 0Min					LSERR	
Peds6b	114:39	Fever		59y M Initial	With nurse	89 Hrs 50Min					RMACA	
ED21a	95:17	Alcohol intoxication		59y M Initial	Awaiting Reg	95 Hrs 17Min					CGRAN	
ED5b	89:38	Abdominal pain		47y M Initial	Treatment area	88 Hrs 40Min					BDUCK	
Peds4a	450:43	Abdominal pain		11y M Initial	Awaiting Clinician	92 Hrs 38Min					MHERN	
ED14g	120:41	Hematuria		76y F Initial	With nurse	90 Hrs 9Min					RWA	

Log Off Help Interf Bed View -Bed NSgn Off Pt Srch With Reg With Nrs Await MD With Resid Releas ed Await Reg With Trg Await Room Treat Area Bed Req Penc Arriv

Monday, January 28, 2002 10:31 Linda Salem, RN # Patients 39

- At a glance the user can determine
  - Acuity
  - Primary Nurse/Physician
  - Location (including out of the department)
  - Length of Stay
  - Types of Orders and Status
  - Allergies
  - Patients triaged awaiting registration
  - Orders that have been entered on Clinical System
  - And other key information
- Highlighting the line of the patient will allow appropriate users to edit areas of the patient record.

# System Implementation: Lessons Learned But Not Forgotten

## A4 Emergency Department EMR

### Documentation

The screenshot shows the 'About The Patient' and 'Triage Information' sections of the A4 Emergency Department EMR. The patient is JANET TEST, female, born 01-Jan-1950, with SSN 234-45-5667 and MR # 71200599. The triage information shows 'Acuity' as 'Acuity unassigned' and 'Enchr Type' as 'Initial'. The 'Sign-In Time' section includes checkboxes for 'Arrival', 'Level of consciousness' (checked), 'Chief complaints/quote', 'Date/time symptoms started', 'ABC's', 'Pain Assessment' (Yes/No), 'Historian', 'Skin color, temperature, moisture', 'PCP/private physician' (checked), 'MMC Affiliates', and 'New MMC Affiliates'. The 'Mental status' text box contains: 'Mental status: Patient is awake and alert ; affect is appropriate. Patient is oriented x 3 <LSZ1 01/28/02 11:30>'. The bottom status bar shows 'Monday, January 28, 2002 11:32 Linda Salem, RN # Patients 39'.

TEST, JANET 52y F Rm: Wait - [Triage]

Track IncCh MPI Summ ChRev Docmt VS Flows AltCare Scan BdView Repts Ref DL

Triage PstHx Nurs NPeds Peds Traum HPI ROS Exam Proc OE Reslts Prog Dx Disp

About The Patient

LName TEST First JANET Mid Sfx VIP Acct# 500500085427

SSN 234-45-5667 Sex Female EstAge DOB (mm/dd/yyyy) 01-Jan-1950 MR # 71200599

Triage Information

Chief Compl. \*\*\*\*\* Acuity Acuity unassigned [Revert] [Save]

Enchr Type Initial Bed Wait

Sign-In Time

Arrival

Level of consciousness ☒

Chief complaints/quote

Date/time symptoms started

ABC's

Pain Assessment ☐ Yes ☐ No

Historian

Skin color, temperature, moisture

PCP/private physician ☒ Yes ☐ No

MMC Affiliates

New MMC Affiliates

Mental status: Patient is awake and alert ;  
affect is appropriate. Patient is oriented x  
3 <LSZ1 01/28/02 11:30>

Log Off Help Note Sketch Photo U Undo

Monday, January 28, 2002 11:32 Linda Salem, RN # Patients 39

- Documentation is user specific, but integrated.
- Documentation can be completed with a series of check box questions which may have other detail or questions nested.
- Additional documentation can be added by selecting the Note button at the bottom which opens a free text box in which the user may type.
- Sketches and Photos can also be added to the record to further enhance documentation.
- Mandatory questions are highlighted in blue to alert the user this documentation must be completed.

# System Implementation: Lessons Learned But Not Forgotten

Emergency Department EMR

## Lessons Learned

- Never attempt to go-live in a time of peak census
- Never attempt to go-live in a time of disaster
- Never try to implement 2 or more major clinical systems at the same time
- If possible run interface in production for as long as possible (minimum 1 week) before go-live to monitor performance and reliability
- Inquire extensively about other sites which are running the same/similar applications/environments to determine what issues/problems they have encountered

# System Implementation: Lessons Learned But Not Forgotten

- Maimonides User Community:
  - 408 Residents
  - 978 Community/Voluntary Physicians
  - 277 Employed Attending Physicians
  - 65 medical students
- All utilize the Medical Center's technology vs. 4% of physicians nationwide





# System Implementation: Lessons Learned But Not Forgotten

## Maimonides Medical Center

Winner of the 1998 Computerworld  
Smithsonian Award in Medicine

Utilizing EMR Technology to  
Improve the Communities We Serve

**“Knowing is not enough;  
we must apply.**

**Willing is not enough;  
we must do.”**

Johann Wolfgang von Goethe  
(1749 – 1832)

